

## **Amendments to the Claims:**

*This listing of claims will replace all prior versions, and listings, of claims in the application:*

1. (Currently Amended) A metal oxide-containing composition, the composition comprising:

metal oxide nanoparticles having a surface, the metal oxide nanoparticles described on average by Formula I:



one or more heteroatom donor ligands bonded to the surface of the nanoparticles, the donor ligands selected from the group consisting of [[of]] 2,2'-bipyridine, pyrazole, imidazole, triazole, tetrazole, and combinations thereof,

wherein

M is a metal consisting of one or more of the following oxidation states: +1, +2, +3, +4, +5, +6, +7, and +8 ;

O is oxygen; and

x and y are numbers having a ratio that is equal to the ratio of an average number of M atoms to an average number of O atoms in the nanoparticles, wherein the average number of ~~M atom~~ M atoms is from about 10 to about  $5 \times 10^{10}$  atoms and the average number of O atoms is at least about 0.01 times the number of M atoms.

2. (Previously Presented) The metal oxide-containing composition of claim 1 wherein M is a metal selected from the group consisting of beryllium, magnesium, aluminum, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gallium, germanium, yttrium, zirconium, niobium, molybdenum, technetium, ruthenium, rhodium, palladium, silver, cadmium, indium, tin, antimony, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, thallium, lead, bismuth, polonium, thorium, protactinium, uranium, neptunium, and plutonium.

3. (Previously Presented) The metal oxide-containing composition of claim 1 wherein M is a metal selected from the group consisting of Group 9 through Group 11 elements.

4 - 5. (Cancelled)

6. (Original) The metal oxide-containing composition of claim 1 wherein the nanoparticles have a mean diameter from about 1 nm to 1000 nm.

7. (Original) The metal oxide-containing composition of claim 1 wherein the nanoparticles have a mean diameter from about 1 nm to 100 nm.

8. (Original) The metal oxide-containing composition of claim 1 wherein the nanoparticles have a mean diameter less than about 20 nm.

9. (Original) The metal oxide-containing composition of claim 1 wherein the nanoparticles have a spherical, ellipsoidal, rod-shaped, or polyhedral morphology.

10. (Original) The metal oxide-containing composition of claim 1 wherein the metal oxide nanoparticles include amorphous or crystalline domains.

11. (Original) The metal oxide-containing composition of claim 1 wherein the nanoparticles include a mixture of metal atoms in different oxidation states.

12. (Cancelled)

13. (Original) The metal oxide-containing composition of claim 1 further comprising one or more loosely bound heteroatom ligands.

14. (Previously Presented) The metal oxide-containing composition of claim 13 wherein the one or more loosely bound heteroatom ligands are selected from the group consisting of nitrate, halide, phosphate, perchlorate, formate, acetate, borate, hydroxide, silicate, carbonate,

sulfite, sulfate, nitrite, phosphite, water, alkyl amines, pyridine, 2,2'-bipyridine, pyrrole, pyrazole, imidazole, triazole, tetrazole, nitriles, carboxylic acids, carbonates, nitrates, nitroalkanes, nitroarenes, hydroxamic acids, ketones, aldehydes, esters or mixtures thereof.

15. - 24. (Cancelled).

25. (Previously Presented) A copper oxide-containing composition, the composition comprising:

    copper oxide nanoparticles having a surface, the metal oxide nanoparticles described on average by Formula II:



    one or more heteroatom donor ligands bonded to the surface of the nanoparticles, the donor ligands selected from the group consisting of 2,2'-bipyridine, pyrazole, imidazole, triazole, tetrazole, and combinations thereof,

wherein

Cu is copper;

O is oxygen; and

    x and y are numbers having a ratio that is equal to the ratio of an average number of Cu atoms to an average number of O atoms in the nanoparticles, wherein the average number of Cu atoms is from about 10 to about  $5 \times 10^{10}$  atoms and the average number of O atoms is at least about 0.01 times the number of Cu atoms.

26. - 27. (Cancelled).

28. (Original) The copper oxide-containing composition of claim 25 wherein the nanoparticles have an mean diameter from about 1 nm to 1000 nm.

29. (Original) The copper oxide-containing composition of claim 25 wherein the nanoparticles have an mean diameter from about 1 nm to 100 nm.

30. (Original) The copper oxide-containing composition of claim 25 wherein the nanoparticles have an mean diameter less than about 20 nm.

31. (Original) The copper oxide-containing composition of claim 25 wherein the nanoparticles have a spherical, ellipsoidal, rod-shaped, or polyhedral morphology.

32. (Original) The copper oxide-containing composition of claim 25 wherein the copper oxide nanoparticles are amorphous or crystalline.

33. (Original) The copper oxide-containing composition of claim 25 wherein the nanoparticles include a mixture of copper atoms in different oxidation states.

34. (Previously Presented) The copper oxide-containing composition of claim 32 wherein M comprises one or both of oxidation states +1 and +2 .

35. (Original) The copper oxide-containing composition of claim 25 further comprising one or more loosely bound heteroatom ligands.

36. (Previously Presented) The copper oxide-containing composition of claim 35 wherein the one or more additional heteroatom containing molecules are selected from the group consisting of nitrate, halide, phosphate, perchlorate, formate, acetate, borate, hydroxide, silicate, carbonate, sulfite, sulfate, nitrite, phosphite, water, alkyl amines, pyridine, 2,2'-bipyridine, pyrrole, pyrazole, imidazole, triazole, tetrazole, nitriles, carboxylic acids, carbonates, nitrates, nitroalkanes, nitroarenes, hydroxamic acids, ketones, aldehydes, esters, or mixtures thereof.

37. - 71. (Cancelled).

72. (New) A metal oxide-containing composition, the composition comprising:  
metal oxide nanoparticles having a surface, the metal oxide nanoparticles described on average by Formula I:

$M_xO_y$  I; and

one or more heteroatom donor ligands bonded to the surface of the nanoparticles, the donor ligands selected from the group consisting of pyrazole, imidazole, triazole, tetrazole, and combinations thereof,

wherein

M is a metal consisting of one or more of the following oxidation states: +1, +2, +3, +4, +5, +6, +7, and +8 ;

O is oxygen; and

x and y are numbers having a ratio that is equal to the ratio of an average number of M atoms to an average number of O atoms in the nanoparticles, wherein the average number of M atoms is from about 10 to about  $5 \times 10^{10}$  atoms and the average number of O atoms is at least about 0.01 times the number of M atoms.

73. (New) The metal oxide-containing composition of claim 72 wherein M is a metal selected from the group consisting of beryllium, magnesium, aluminum, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gallium, germanium, yttrium, zirconium, niobium, molybdenum, technetium, ruthenium, rhodium, palladium, silver, cadmium, indium, tin, antimony, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, thallium, lead, bismuth, polonium, thorium, protactinium, uranium, neptunium, and plutonium.

74. (New) The metal oxide-containing composition of claim 72 wherein M is a metal selected from the group consisting of Group 9 through Group 11 elements.

75. (New) The metal oxide-containing composition of claim 72 wherein the nanoparticles have a mean diameter from about 1 nm to 1000 nm.

76. (New) The metal oxide-containing composition of claim 72 wherein the nanoparticles have a mean diameter from about 1 nm to 100 nm.

77. (New) The metal oxide-containing composition of claim 72 wherein the nanoparticles have a mean diameter less than about 20 nm.

78. (New) The metal oxide-containing composition of claim 72 wherein the nanoparticles have a spherical, ellipsoidal, rod-shaped, or polyhedral morphology.

79. (New) The metal oxide-containing composition of claim 72 wherein the metal oxide nanoparticles include amorphous or crystalline domains.

80. (New) The metal oxide-containing composition of claim 72 wherein the nanoparticles include a mixture of metal atoms in different oxidation states.

81. (New) The metal oxide-containing composition of claim 72 further comprising one or more loosely bound heteroatom ligands.

82. (New) The metal oxide-containing composition of claim 81 wherein the one or more loosely bound heteroatom ligands are selected from the group consisting of nitrate, halide, phosphate, perchlorate, formate, acetate, borate, hydroxide, silicate, carbonate, sulfite, sulfate, nitrite, phosphite, water, alkyl amines, pyridine, 2,2'-bipyridine, pyrrole, pyrazole, imidazole, triazole, tetrazole, nitriles, carboxylic acids, carbonates, nitrates, nitroalkanes, nitroarenes, hydroxamic acids, ketones, aldehydes, esters or mixtures thereof.

83. (New) A copper oxide-containing composition, the composition comprising:  
copper oxide nanoparticles having a surface, the metal oxide nanoparticles described on average by Formula II:



one or more heteroatom donor ligands bonded to the surface of the nanoparticles, the donor ligands selected from the group consisting of pyrazole, imidazole, triazole, tetrazole, and combinations thereof,

wherein

Cu is copper;

O is oxygen; and

x and y are numbers having a ratio that is equal to the ratio of an average number of Cu atoms to an average number of O atoms in the nanoparticles, wherein the average number of Cu atoms is from about 10 to about  $5 \times 10^{10}$  atoms and the average number of O atoms is at least about 0.01 times the number of Cu atoms.